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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/932,236

08/16/2001

Haining Yang

MI22-1725

4828

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EXAMINER

MITCHELL, JAMES M

ART UNIT

PAPER NUMBER

2813

MAIL DATE

DELIVERY MODE

07/03/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

09/932,236

Applicant(s)

YANG, HAINING

Examiner

James M. Mitchell

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2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 April 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 55 and 70-74 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 55 and 70-74 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/10/07</u> .   | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

This office action is in response to the request for continued examination filed April 10, 2007.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 55 and 70-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan et al. (U.S. 6,984,591) in combination with Marsh (U.S. 2001/0055869) Uhlenbrock et al. (U.S. 6,690,055) and Kobayashi et al. (U.S. 2002/0098686).

Buchanan (e.g. Fig.30) discloses:

(cl. 55, 71) a method of forming a conductive material, comprising: providing a semiconductor substrate (30); forming an insulative material (83) over the substrate,

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wherein the insulative material comprises sidewalls defining an opening extending to the substrate in at least one cross-section (e.g. recess); forming a first conductive material (31) over the substrate and within the opening, the first conductive material comprising one or more of TiN, WN, TaN, elemental Ta, and elemental Ti (Col. 28, Lines 29-30); depositing a second conductive material (82) physically against the first conductive material into a rectangular block (e.g. vertical portion between 81 & 38), the second conductive material consisting essentially of a metal and being different than the first conductive material (e.g. "Cu"; Col. 28, Lines 30-33), wherein the depositing comprises: providing a metallo-organic precursor proximate the first conductive material, wherein the metallo-organic precursor comprises ruthenium, Ru; and exposing the precursor to a reducing atmosphere to release the metal from the precursor(Abstract) to form the second conductive material physically against the first conductive material without an insulative composition between the first and second conductive materials (Col. 8, Lines 26-29); (cl. 70, 74) wherein the block (e.g. portion above 38) is aligned horizontally above the insulative material in at least the one cross-section.

Buchanan does not appear to explicitly disclose its precursor as tricarbonyl-cyclohexadiene ruthenium, its reducing agent as ammonia, that the second conductive material has a thickness of about 450 or etching the second conductive material to form its rectangular block, wherein the sidewalls of the block are aligned vertically between the sidewalls defining the opening in at least the one cross-section.

Marsh teaches use of tricarbonyl-cyclohexadiene ruthenium (Par. 0055, 0072).

It would have been obvious to one of ordinary skill in the art to incorporate the use of tricarbonyl-cyclohexadiene ruthenium to the process of Buchann in order to provide a ruthenium precursor as taught by March (Par. 0055).

Neither Buchanan nor Marsh discloses a reducing agent of ammonia, but rather hydrogen (H.sub.2).

However, Uhlenbrock shows that H.sub. 2 and ammonia, NH.sub.3 are known reducing agents used to produce equivalent structures. Thus, it would have been obvious to one of ordinary skill in the art to substitute NH.sub. 3 for H.sub.2 as an equivalent reducing agent.

Buchanan does not appear to explicitly disclose etching of its second conductive material to form its electrode (82).

However, Kobayashi teaches the use of etching to form its electrode (Par. 0022).

It would have been obvious to one of ordinary skill in the art to incorporate the use of an etching step to the modified process of Buchanan in order to shape the electrode as taught by Kobayashi (Fig. 2).

With respect to the claimed thickness of the conductive material, applicant has not disclosed that the claimed size/particular dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ

237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Ex. Mitchell, J.D.  
June 24, 2007

A large, stylized handwritten signature in black ink, likely belonging to J.D. Mitchell, is written over the typed name and date. The signature is fluid and cursive, with a large initial 'J' and 'M'.